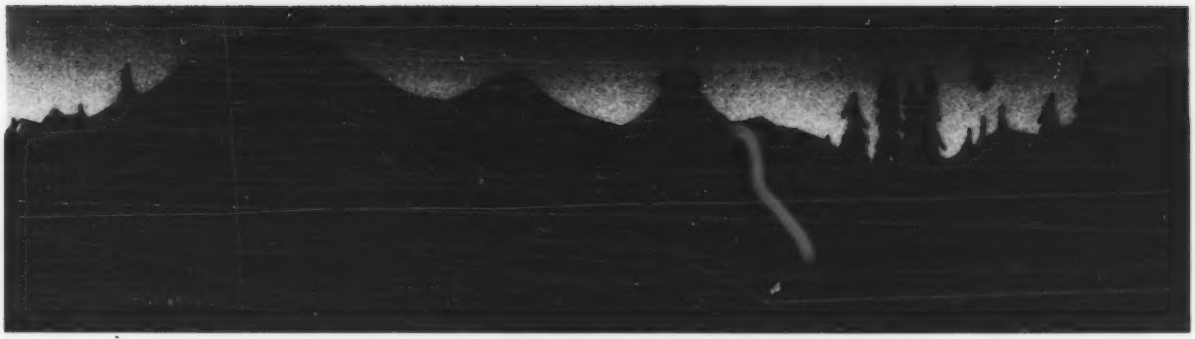

MINE RECLAMATION IN BRITISH COLUMBIA

POLICY OVERVIEW

Ministry of Energy, Mines
and Petroleum Resources

September 1991

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INTRODUCTION

Mining is British Columbia's second largest industry and a major contributor to the province's economic development and its resultant prosperity. Clearly, mining is a highly valued use of the province's land base.

The 1990s promise to be a decade in which the precepts of "sustainable development" provide both the motivation and the framework for innovations in resource management policy. For mining, the reclamation of exhausted mine sites is one of the key ways in which sustainable development can be achieved. This paper reviews current reclamation policies for British Columbia and establishes an agenda for the future.

Current provincial legislation regards mining as a temporary land use and requires all mining companies to carry out a program of environmental protection and reclamation so that, upon termination of mining, the land and watercourses are returned to a safe and environmentally sound state and to an acceptable, productive end use.

The Ministry is committed to achieving reclamation by establishing a clear framework within which both industry and government can work. Legislation seeks to establish broad standards and encourages industry to be innovative and cost effective in meeting these standards. The Ministry is committed to base all decisions on the best available information, and on reasoned judgement. As well, the Ministry is committed to be accountable to the public and industry.

British Columbia was one of the first jurisdictions in Canada to enact mine reclamation legislation and the first to extend this policy to exploration sites. Due to the leadership exercised by the government, the mining industry and, later, the exploration sector, the British Columbia mining industry has become widely recognized for its achievements in mine reclamation.

Government has regulated mine reclamation for a total of 22 years and during this time has seen the mining industry evolve from one composed almost exclusively of underground operations, to an industry consisting mainly of large-scale open-pits. Coal and copper mining has expanded greatly, and more recently gold mining is again becoming important.

In looking to the future, therefore, it is possible to review our many achievements and to build on a solid record of accomplishment. At the same time, we must recognize those instances where our policies and legislation could be improved.

This paper, in conjunction with a number of policy papers, is intended to describe the existing mining and regulatory framework, to clarify the Ministry's future initiatives and policy direction, and to initiate discussions among industry, government and the public to develop reclamation regulation and policy for the 1990s.

HISTORY OF LEGISLATION

Reclamation legislation was first enacted in 1969 when existing mining legislation was amended to require reclamation for major coal mines and hardrock mineral mines.

In 1973, legislation was amended to include coal exploration, mineral exploration, sand and gravel pits and quarries.

In 1984, the Minister of Energy, Mines and Petroleum Resources published reclamation guidelines.

The **Mines Act** remained relatively unchanged until it was amended in 1990. This amended Act and its accompanying Code provides the framework for reclamation policy in the 1990s.

INSIDE: **PAGE**

Mining Land Base and Reclamation 2

Current Policy Framework 3

Ministry Initiatives 7

MINING LAND BASE AND RECLAMATION

Since the late 1960s the mining industry has steadily grown and now utilizes a much greater land base. Major coal and metal mines, which occupied less than 1,000 hectares in 1969, had by the end of 1990, expanded to cover 30,019 hectares. Revegetation activities have reclaimed almost 26 per cent or 7,926 hectares (Chart 1) (Figure 1).

The graphs below show the separate breakdown of disturbed and reclaimed land at all the metal (Figure 2) and coal (Figure 3) mines. By themselves coal mines have disturbed 12,641 hectares, and 4,519 hectares, or 36 per cent, have been reclaimed. Metal mines have disturbed 17,378 hectares, and 3,407 hectares, or 19 per cent, have been reclaimed.

The data presented in Figures 1, 2 and 3 indicate that disturbance is increasing at a faster rate than reclamation. This can largely be explained by the expansion of the mining industry during the past 20 years. Should there be a general industry decline, where mines start closing at a rate faster than they are opening, then the rate of reclamation would be expected to exceed the rate of disturbance.

The fact that more land has been reclaimed at coal mines partly reflects the different mining conditions. Most metal mine ore deposits are contained in single pits which continually expand as mining proceeds. Coal seams, on the other hand, are usually relatively shallow stratabound deposits which can be mined and immediately backfilled and reclaimed, allowing more rapid reclamation success.

ACREAGE DISTURBED AND RECLAIMED, 1990

Type of Mine	Disturbed	Reclaimed
Coal Mines	12,641	4,519
Metal Mines	17,378	3,407
Total	30,019	7,926

Chart 1

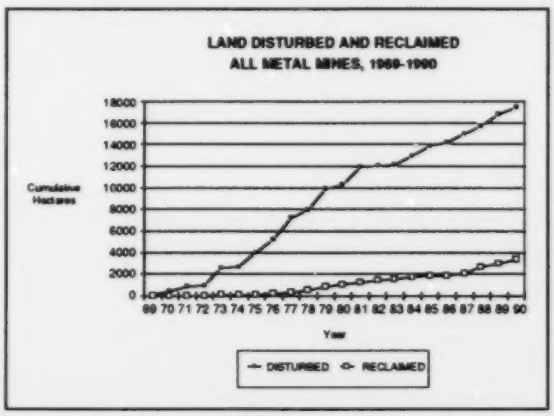

Figure 2

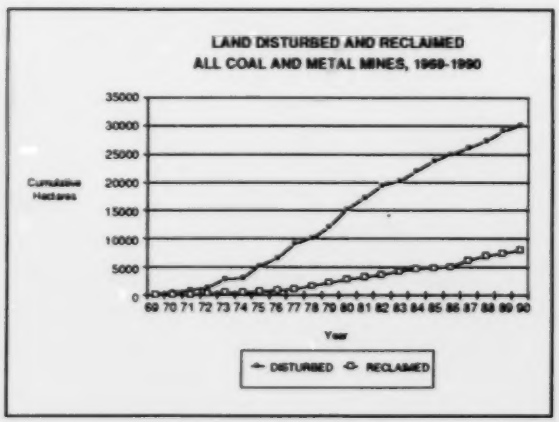

Figure 1

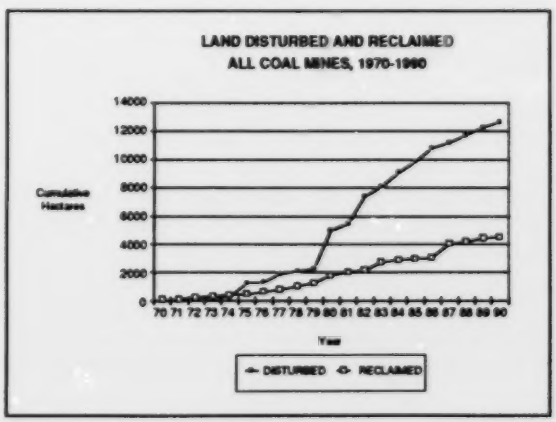

Figure 3

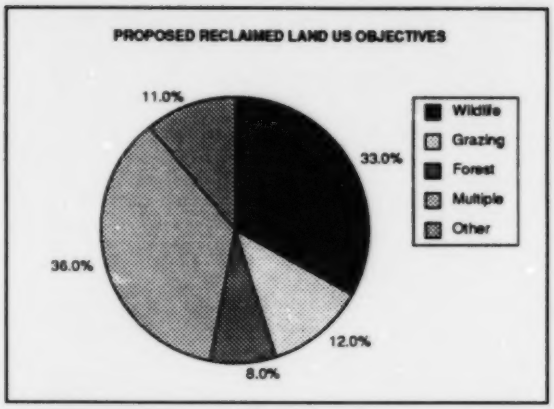

Figure 4

Over 50 per cent of proposed reclaimed land use objectives are aimed at providing wildlife habitat, grazing and forestry opportunities (Figure 4).

In addition, mine reclamation legislation and policy ensures prevention or treatment of effluent escaping from a mining property. The environmental and social consequences of uncontrolled acid effluent could have a major impact on water quality far from the mine site.

Of the 16 metal mines currently operating in British Columbia, six are producing acid mine drainage and several more have the potential to do so. These six mines are currently collecting and treating all acidic drainage.

Of the eight operating coal mines, none are presently generating acid mine drainage. Although one coal mine has the potential to do so, it has been designed to prevent acid mine drainage. For proposed new mines, government policy is to approve only those mines which develop mine plans that prevent or control acid mine drainage.

The opposite problem, alkaline mine drainage, can also be a concern. Metals such as molybdenum are soluble at high pH and are present in elevated levels at several mines in British Columbia.

Acid mine drainage sludge at Equity Silver mine.

CURRENT POLICY FRAMEWORK

There are a series of environmental protection and reclamation standards which are administered according to the type of activity. The standards described in Part 10 of the **Health, Safety and Reclamation Code for Mines in British Columbia** pertain largely to major coal and mineral mines. These standards define the meaning of mine reclamation which involves many issues including returning the land and watercourses to a productive land use, ensuring that impoundment structures and waste rock dumps are stable over the long-term, and ensuring that water quality released from a mine site is of an acceptable standard. In addition, mineral exploration standards are outlined in the **Guidelines for Mineral Exploration**, and coal exploration standards in the **Guidelines for Coal Exploration**. Standards for placer mines and sand and gravel pits are set as conditions of individual reclamation permits.

Mineral Exploration

Mining activities impact on the land base to varying degrees. Prospecting and air-borne surveys have little or no impact over very large areas, whereas a large-scale, open-pit mine has an intense impact on a confined area.

Between these two ends of the spectrum lie a variety of activities which have progressively greater impacts on the environment over

progressively smaller areas. This is the domain of mineral exploration: line cutting; the establishment of drill sites; the digging of trenches and test pits; and the development work required to open a mine. In addition, there will be impacts from establishing exploration camps and, in some cases, from building trails, roads and bridges.

Exploration drill site (photo by Highland Valley Copper).

The approval process for mineral exploration begins with the submission (by an exploration firm) of a Notice of Work to the local District Inspector of Mines. The Notice is then referred to the appropriate provincial, federal and local government agencies. The usual referral period is 30 days. Based on the **Guidelines for Mineral Exploration**, the special knowledge of the District Inspector and the responses received from agencies, the District Inspector issues a Reclamation Permit including pertinent conditions or restrictions. At this time a reclamation security bond is also posted by the company.

A more stringent review process is required in Community Watersheds, provincial Recreation Areas, and in designated areas where uranium or thorium may be present.

For the most part, the on-site impacts of exploration carried out in accordance with the **Guidelines for Mineral Exploration** can be controlled and reclamation is successful. Public concern relating to mineral exploration is largely focused on the requirement for road access into remote areas. The issue of road access is currently under consideration as part of a government-wide policy review on resource roads.

Reclaimed exploration road in northeastern B.C.

Mining

Mining, especially open-pit mining, has an intense impact. For example, for every kilogram of copper produced in British Columbia there may be 200 kilograms of waste rock excavated and stored in waste dumps and another 200 kilograms of tailings. The environmental acceptability of mining hinges on being able to confine these impacts to a limited area and, following closure, to achieve an acceptable reclamation standard.

For major mines, the Ministry's philosophy has been to set broad reclamation standards which allow each company to develop their own program on a site-by-site basis. The standards set out in the **Mines Act** and accompanying Code maintain this philosophy. They were produced following considerable discussion with industry and other government agencies.

Since reclamation legislation was first introduced, companies have now largely integrated their reclamation planning into the overall mine planning process.

Through the Mine Development Assessment Process (MDAP), a conceptual plan for reclamation must be included in the company's application for a mine development certificate. The concerns of other provincial and federal government agencies, such as B.C. Environment and Environment

Open-pit mining disturbs large areas of land which must later be reclaimed.

Canada, are addressed in this plan. Companies must obtain a reclamation permit under the **Mines Act**, once a mine development certificate has been issued under the MDAP.

The permit system itself has remained relatively unchanged since 1969 and provides for:

A Reclamation report - to be submitted prior to commencement of operations.

Publication of a Notice of Filing in the B.C. Gazette and local newspapers - this is a requirement for major mines and, depending on the level of public concern, can be required for exploration activities or placer mines.

Report review - by an inter-agency committee of government. The Regional Mine Development Review Committees provide the detailed technical review, and the Victoria-based Reclamation Advisory Committee is the coordinating body.

Reclamation security - reclamation securities are required as a condition of all reclamation permits. Over the last several years, reclamation security bonds have been increased on many properties, as permits have been revised or renewed. This policy reflects government's desire to reduce the possibility that public funds might be required to reclaim a mine in the case of default, by more accurately reflecting outstanding reclamation obligations of each mine property.

Figure 5 shows the status of reclamation security deposits from 1985 to December 30, 1990. As of March 31, 1991, reclamation deposits totalled over $64 million.

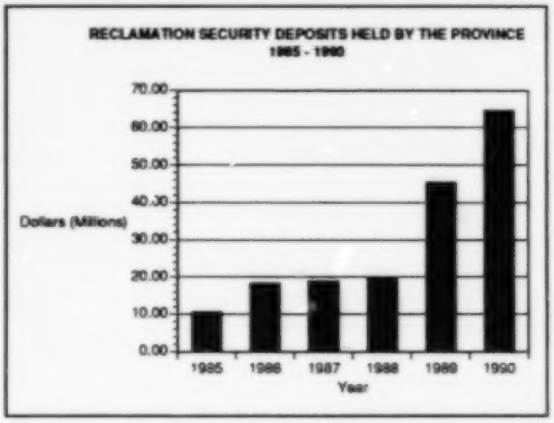

Figure 5

At present, the only securities acceptable include cash, bonds guaranteed by the Government of Canada of not longer than three years duration, and an irrevocable letter of credit. Insurance Act bonds are currently unacceptable.

The **Mines Act** also makes provision for a mine-specific reclamation fund which enables companies to set aside money today for obligations which are being incurred (such as acid mine drainage) that will require funds to be expended at some future date. This fund will be the subject of a future discussion paper.

Reclamation Permit - a permit is issued with special terms and conditions based upon recommendations from the Reclamation Advisory Committee as well as public response.

Continual and progressive reclamation - is required over the life of the mine including an annual submission of a report describing the progress of reclamation research and operations.

Confiscation - where there is non-compliance with conditions of the Reclamation Permit the Minister may order closure of the mine and forfeiture of the security.

Permit amendment - like many other approvals, those for reclamation require continual updating. The company's proposed mine plan, and hence its reclamation plan, may change due to economic, geological, or environmental factors. Thus, the Reclamation Advisory Committee regularly reviews reclamation programs and modifies permit conditions and security levels.

Abandoned Mine Sites

Mining has taken place in British Columbia since the mid-1800s, but reclamation requirements were first legislated in 1969. There are, therefore, a number of old mining sites which were not reclaimed when operations ceased. In many cases, nature has successfully undertaken this function and many sites are no longer visible. In other cases the mines are of historic significance and the remnants of mining are protected and preserved.

However, there are instances where old sites create a safety hazard, for example, unsealed underground workings and shafts or collapsed tunnels which create surface slumps. In these cases, the Resource Management Branch of the Ministry is responsible for taking action to ensure public safety.

There are also mine sites which are, or have the potential to be, generators of acid mine drainage. Fortunately, many of these older pre-legislation sites tend to be small, underground operations and the impacts are manageable. It is also fortunate that some of these sites once again represent attractive exploration targets. Wherever possible, the Ministry seeks to encourage such exploration in the hope that a viable mine can be established since, in the course of developing a new mine, the old problems can often be cleaned up quite readily.

The administration and control of acid mine drainage from historic sites is shared between B.C. Environment, Environment Canada and the Ministry of Energy, Mines and Petroleum Resources. The Ministry of Energy, Mines and Petroleum Resources' policy is to encourage mining on these old properties. If government rigorously enforces effluent standards on these properties mining interests may avoid future explanation and development causing the properties to revert to the Crown.

If the original mine owner or operator responsible for the damage can be identified, it is the policy of the Ministry to hold the company liable even if the damage occurred prior to 1969. Frequently, however, the owner cannot be identified, does not have the financial capacity to pay for the damage, or challenges the liability. Government may then have to assume responsibility for these so-called "orphan" sites.

The Ministry has assumed responsibility for reclamation of several closed mine sites including the Mount Washington mine on Vancouver Island and the Union mine near Greenwood.

The Ministry has extensive records on exploration and mining activity dating back to the previous century. Although the quality of the database does depend on the regulations in effect at the time, the potential for major "surprises" seems bounded. At present there are only a few known historic sites considered likely to require remedial action either now or in the future.

The reclamation of abandoned contaminated mine sites is now covered by a more general federal-provincial agreement and the costs of eligible clean-up projects can be shared equally by the two governments.

Mt. Washington reclamation project, Vancouver Island.

MINISTRY INITIATIVES

The Ministry will continue to undertake a variety of initiatives to improve the success of environmental protection and reclamation programs in British Columbia. We currently are committed to greater public information and involvement in decision-making processes, more research into critical areas of concern including acid mine drainage and waste rock dump stability, and improvements in permitting and approval processes.

Public Information and Involvement

Public Information - the Ministry has undertaken a number of initiatives to improve public access to information about exploration and mining sectors:

(a) Mineral Market Update (MMU): Published quarterly and distributed free of charge, the MMU contains current information on all Ministry programs. The MMU provides quarterly status reports on projects in the Mine Development Assessment Process and a summary of statistics on exploration and reclamation permits issued.

(b) Annual report: The Ministry of Energy, Mines and Petroleum Resources has prepared an annual report on mining since 1874 which provides an historical documentation of mine related activity in British Columbia. Since 1969, this report has described reclamation activities and achievements and during the past five years has included complete statistics on reclamation, including current and cumulative data on areas disturbed and reclaimed and the status of reclamation security.

(c) Database Development: The Ministry has established computerized databases incorporating comprehensive information on all reclamation permits and security and is now able to respond more effectively to public requests for information on all matters related to the administration of reclamation policy.

Increased public participation in review of sensitive exploration activity - to date there has been relatively limited public involvement in mineral exploration proposals. However, the **Mines Act** has incorporated a specific provision for companies to file a notice in the B.C. Gazette and local newspapers. All companies exploring in sensitive areas such as Community Watersheds and Recreation Areas will now be required to publish a notice in the B.C. Gazette and local newspapers to solicit recommendations from interested parties.

Opportunities for public involvement at all stages in the Mine Development Assessment Process - consultation is required before a company's application is accepted for disposition, during the review and disposition of an application and during an inquiry by an assessment panel. Because there is no one formula which will meet the needs of the public in all cases, consultation is determined on a project-by-project basis.

Opportunities for public involvement during mine closures - public surveillance committees have been formed to review and advise on closure standards and options. Committees have been formed for Equity Silver and Brenda Mines and a committee will be established at Kimberley to review the proposals for closure of the Sullivan mine.

Sedimentation pond reclamation (photo by Byron Creek Collieries).

Improved Regulations

There are many initiatives presently underway to improve and streamline the regulatory framework for mine reclamation.

The proclamation of the **Mines Act** in 1990 made several significant improvements to the regulation of mine reclamation. The Act, for the first time, formalized the mine reclamation guidelines within

legislation. It also provided for the establishment of a mine-specific reclamation fund. In addition, the Ministry is undertaking a number of initiatives to revise existing legislation, to update existing guidelines, to clarify policies on acid mine drainage and to streamline existing review procedures.

Mine Reclamation Fund - section 12 of the **Mines Act** provides for the establishment of mine-specific reclamation funds. The Funds are intended for those mines that will require mitigation for a long period of time after closure but will not have any operating income with which to fund that work. The Funds will be established so that revenue generated by the Funds will be sufficient to provide for that work. Fund payments will be deductible under the B.C. **Mineral Tax Act**. Deductibility under the Income Tax Act of Canada is the subject of ongoing discussions with representatives of the Federal Department of Finance.

Security review - with the passage of the revised **Mines Act** the previous statutory restriction of $2,500 per hectare of disturbance during the first year has been eliminated. In many instances this limit was well below the cost of reclamation. For new mines, security levels are now being set to reflect the estimated costs of reclamation based on a formal assessment of costs and risks to the province. There will be a greater reliance on advice from technical and risk management professionals.

For existing operating mines, the Ministry is reviewing security levels to better reflect the estimated costs of outstanding reclamation. It is government policy to stage any increases over several years so as to make it less onerous on the mining industry.

Mines may require inspection and monitoring for many years following closure. Where there will be a likelihood of maintenance, companies will be required to establish long-term financial security.

Bonding protocol with the Ministry of Environment - this Ministry and B.C. Environment have developed a bonding protocol to combine the security requirements of both ministries. The Minister of Energy, Mines and Petroleum Resources will be responsible for holding the security.

Bonding protocol with the Ministry of Forests - a letter of understanding between the Ministry of Forests and the Ministry of Energy, Mines and Petroleum Resources has been signed. This agreement confirms the Ministry as the lead agency in mineral exploration programs and eliminates the requirement for the placement of a bond under the **Forest Act**.

Updating of the Guidelines for Mineral Exploration - the present guidelines will be reviewed and additional procedures and regulations for work in Community Watersheds and Wilderness Areas will be incorporated.

Commitment to review and update regulations - as part of the **Mines Act**, a committee will be established to annually review all parts of the Code. To balance the discussion, this committee will include representatives from industry, government, universities and environmental interest groups.

Streamlining review and permitting processes - there will be increased coordination within government to ensure that approvals and permits under the **Mines Act** are coordinated with the issuance of a mine development certificate under the Mine Development Assessment Process.

Restructuring of the Resource Management Branch - the branch has been reorganized to provide greater focus on environmental and reclamation issues.

Formalization of an acid mine drainage policy - the Ministry, in cooperation with B.C. Environment and Environment Canada, has formalized its working policy on acid mine drainage.

Historic site inventory - the Ministry maintains a database of all known mineral occurrences known as MINFILE. This database is currently restricted to geological information. A program has been initiated to include within this database, information on acid mine drainage that is occurring on all historic sites.

Support for Research Programs

The Ministry has encouraged and supported reclamation-related research. Funding has been allocated for research from the Canada/British Columbia Mineral Development Agreement and, more recently, the Sustainable Environment Fund and has resulted in a number of advances in our knowledge and understanding of reclamation matters.

British Columbia Acid Mine Drainage Task Force - the Ministry is currently a major contributor and participant in the British Columbia Acid Mine Drainage Task Force to investigate the prediction, prevention, treatment and control of acid mine drainage. A total of 13 projects were supported in 1989/1990 and an additional 12 in 1990/1991.

Reclaimed waste dump at Westar Mining.

Waste Dump Research - the Waste Dump Research Committee was formed to foster research in the design, construction and monitoring of large waste rock dumps. The Research Committee is chaired by the Chief Inspector and draws its membership from the Ministry of Energy, Mines and Petroleum Resources, B.C. Environment, industry and industry associations.

Technical and Research Committee on Reclamation - this committee consisting of members from the Ministry of Energy, Mines and Petroleum Resources, B.C. Environment, Environment Canada, mining companies, B.C. Mining Association and the Coal Association of Canada has been active in promoting and fostering reclamation research for over 15 years. The committee has organized the annual B.C. Mine Reclamation Symposium for the past 14 years. The Canadian Land Reclamation Association has recently awarded this committee the Dr. E.M. Watkin Award of Merit for its outstanding contribution to land reclamation.

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